

What is claimed is:

1. A method for determining the dry density and moisture content percentage of soil using electrical means, the method comprising the steps of,

Inserting two conducting electrodes into the soil to be measured,

exciting the electrodes with an alternating current (AC) voltage,

measuring the current through the soil, the voltage across the excited electrodes, and the phase relationship between the measured current and measured voltage,

calculating from these measured values, the equivalent soil electrical resistance and electrical capacitance,

performing these steps several times on soils of differing densities and/or moisture contents,

using standard geotechnical testing procedures to determine the wet density and unit weight of water in a test sample of each area of soil that was electrically measured,

computing the best fit regression between the wet density and the soil real electrical impedance as calculated from the values of AC measurement frequency, electrical resistance, and electrical capacitance,

computing the best fit regression between the unit weight of water as determined from the physical soil measurement, and the quotient of calculated soil electrical capacitance and soil electrical resistance,

repeating the electrical measurements in new locations of the same soil type that have not been tested with physical means,

calculating the equivalent soil electrical resistance, capacitance, and real impedance for these new locations,

using the regression equations developed from initial calibration testing to predict the wet density and unit weight of water for the new soil locations,

and finally calculating the dry density and moisture content percentage from wet density and unit weight of water using standard geotechnical equations.

2. The method of claim 1 wherein the position, placement, and/or length of the conducting electrodes is varied to change the area and depth of the electrical measurement field in the soil.
3. The method of claim 1 wherein the number of conducting electrodes may be more than two.
4. The method of claim 1 wherein the calculations, computations, regressions, and other mathematical or logical manipulations are automatically performed and the results displayed using an electronic computing device.
5. The method of claim 1 wherein the maximum dry density value for the soil being tested, as determined by geotechnical means, can be entered into the computing device, and using the EDG determined dry density, a calculation of percent compaction is displayed.
6. The method of claim 1 wherein the measured electrical values are automatically corrected for differences in soil temperature with suitable means.